Pointers on design and operation of cattle restrainer systems

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By TEMPLE GRANDIN

AS THE MEAT packing industry becomes more sophisticated and automated, it was necessary to develop new technology in order to dispatch cattle humanely and efficiently with a minimum of bruising and expense during the handling.

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The first major innovation in restraining and shackling systems for cattle was the restrainer conveyor system. These systems are currently in use in at least 12 beef plants in the United States.

In one plant, up to $500 per day is being saved as a result of reducing trim losses. This plant converted from a knocking pen system, where three cattle are held in each compartment, to the conveyor or restrainer. Contrary to popular belief, cattle can be bruised immediately before or after stunning. Another advantage of the conveyor restrainer is increased employe safety and humane cattle treatment.

The principle of the conveyor restrainer is as follows:

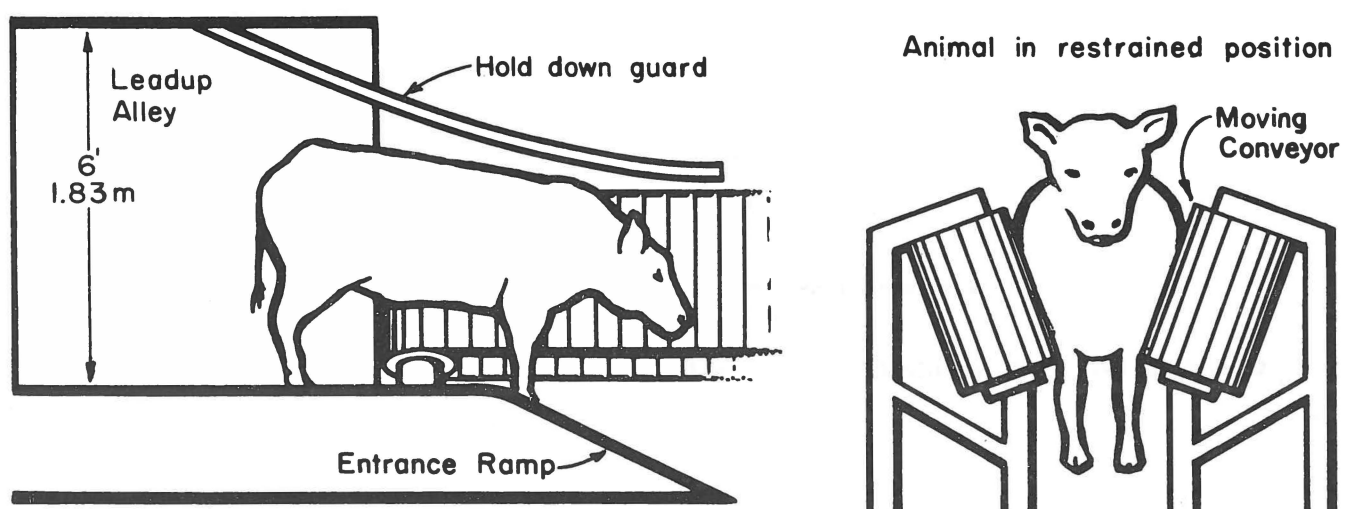
Cattle are held between two moving conveyors with their feet hanging out below. While the animal is held in this position, it is stunned and the shackle then is attached. It is then discharged onto a takeaway conveyor or slide and transported to the bleed rail. Proper installation and operation of the equipment is essential for smooth, efficient operation.

Operating recommendations

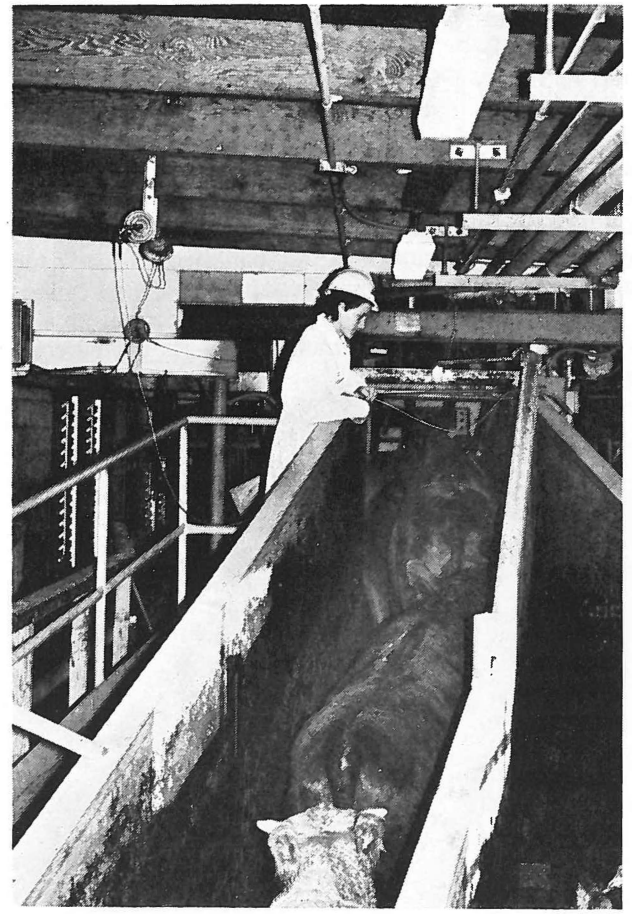
The most important part of any cattle handling system is the people who run it. The employe who feeds the cattle into the conveyor restrainer should persuade the cattle to enter the unit in a steady stream. Forcing them to enter faster than the conveyor is able to pick them up will cause them to balk and become agitated. Using an electric prod on an animal when there is no place for it to go usually will result in its balking, or it may even lie down. Working the cattle carefully and gently through the system is the most efficient method.

To facilitate the stunning process, the animal's head should be up when it enters the restrainer conveyor. To encourage an animal which has its head down to raise it, the drover can tap the side of the neck. For maximum efficiency and ease, the stunner should be applied when the animal's head first emerges from underneath the hold-down rack. This also will make the shackler's job easier.

When cattle are stunned, they usually retract their legs suddenly. Stunning the animal when it first emerges from underneath the hold-down rack will give the legs a chance to relax and drop back down. This will enable the shackler to attach the shackle more easily. Once the shackler is attached, the



SKETCHES show the basic principles that are applied to a well-designed cattle restrainer system.



WATCHING animals move past slaughter gate, which permits drover to switch back and forth between two chutes, is Temple Grandin, one of designers of new cattle handling system at Swift Fresh Meat Co., Tollison, Ariz. Second chute is at far right of photo.

in.; range cows and Brahman crosses, 11 to 11½ in.; very fat Choice and Prime cattle, 13 in.

Experience has shown that the dispatcher's platform should be 24 in. from the platform floor to the outside upper edge of the restrainer flights if a hand stunner is used. If it is to be used with an air stunner with an overhead balancer, the platform may be raised 4 to 6 in.

There are many different types of conveyors and slides for conveying stunned cattle to the bleeding area, and this part of the system often has to be custom designed. The simplest takeaway consists of a metal slide. Shackled cattle are discharged onto the slide, after which an incline conveyor carries them to the rail. A heavy steel bar maintains a tension on the leg shackle. Proper adjustment of the tension bar is important to keep the shackle from falling off. The slide plate system is recommended for plants that have a chain speed of *less* than 150 head per hour.

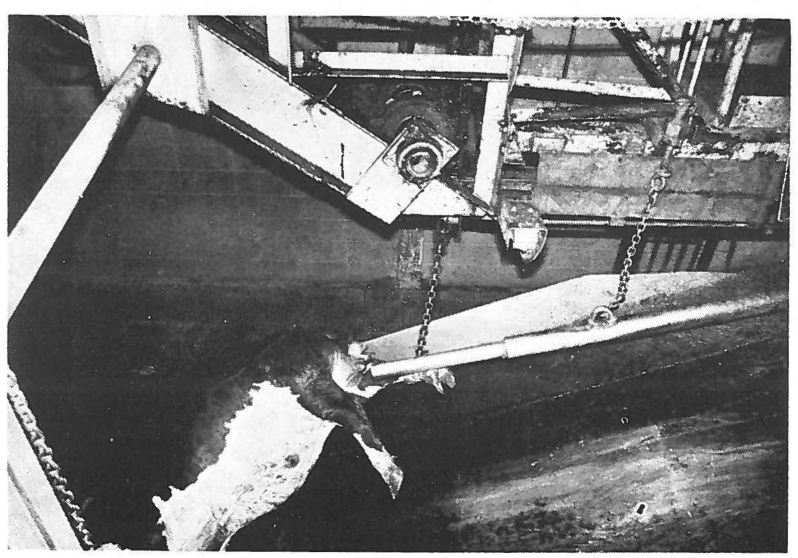
One advantage of the slide is that it is less expensive to install than is a slat conveyor. At high chain speeds, however, it may be more expensive in the long run because of the wear and tear on the shackles. Even at best, slide systems operate more jerkily than slat conveyors. If you decide upon a slide, it should be built at a 25-degree angle.

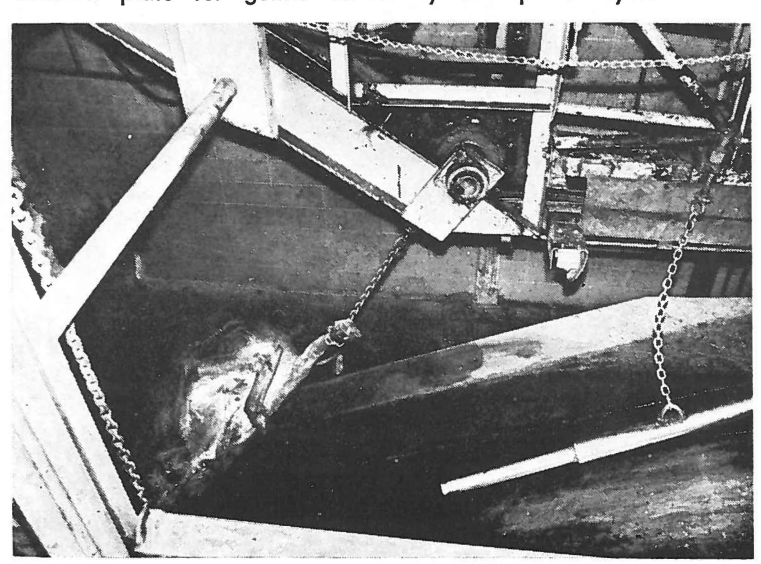
The power slat conveyor takeaway is the most desirable system, especially for ultra high-speed slaughter plants. Many jerking problems that are associated with slides can be practically eliminated by means of a slat conveyor. The angle of the slat conveyor should not exceed 15 degrees; otherwise, the stunned cattle will be conveyed and slide at the same time. This could cause jerking. The slat conveyor and the incline conveyor should operate at a higher rate of speed than does the restrainer conveyor. An effective way to increase the capacity of the incline conveyor is to space the rollers closer together.

The rail going from the restrainer conveyor to the base of the incline conveyor should be at a very slight downward slope. The last 24 to 36 in. of rail, where the trolleys enter the incline conveyor, should be pitched more sharply to ensure that the rollers will pick up the trolleys.

In some plants, the incline conveyor is eliminated. The restrainer conveyor is raised up to the level of the bleed rail. In this type of system, a braking device is recom-

PROPERLY designed slideaway plate (left) helps maintain tension on stunned animal's shackled leg. This allows (right) animal to move all the way to bottom of slide-off plate for gentle lift-off by takeup conveyor.





mended to prevent the trolleys from traveling at an uncontrolled rate into the bleed area. A power slat conveyor is the preferred system for conveying stunned cattle after they have been discharged from the conveyor restrainer. One advantage of this system is that the maintenance and expense of the incline conveyor is eliminated. The major disadvantage is the extreme height of the restrainer.

Unfortunately, there is no standardization within the industry regarding shackle length. These shackles range in length from 48 in. to more than 60 in. in existing restrainer installations. Long shackles can cause problems because maintaining tension on the long chains is more difficult. One way to alleviate this problem is to use a combination slide and slat-conveyor system. This combination also is useful in plants that are being remodeled, because space is sometimes limited. Another suggestion is to place the slat conveyor on a slight angle so the stunned cattle are pulled away from the incline conveyor.

Of course there are many other points of importance in the selection and installation of a conveyor restrainer system, but the foregoing should give at least some of the basic principles that should be considered. □